

# 1,1'-Diethyl-2,2'-carbocyanine iodide

sc-206215



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

1,1'-Diethyl-2,2'-carbocyanine iodide

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and  
Canada: 877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436  
2255 (1-800-CHEMCALL) or call +613 9573 3112

### PRODUCT USE

Dye-stuff. Acid-base indicator. Colourless at pH 1.4; red at pH 3.2

### SYNONYMS

C25-H25-I-N2, "1, 1' -diethyl-2, 2' -carbocyanine iodide", "1, 1' -diethyl-2, 2' -carbocyanine iodide", "1-ethyl-2-(3-(1-ethyl-2(1H)quinolyliidenepropenyl)quinolium iodide", "1-ethyl-2-(3-(1-ethyl-2(1H)quinolyliidenepropenyl)quinolium iodide", "bis(1-ethylquinoline-(2)trimethinecyanine iodide", "1, 1' -diethyl-2, 2' -trimethinequinocyanine iodide", "1, 1' -diethyl-2, 2' -trimethinequinocyanine iodide", carbocyanine, "Quinaldine Red", pinacyanole, "quinolinium, 1-ethyl-2-(3-(1-ethyl-2(1H)-quinolinylidene)-1-propenyl)", "iodide, "quinolinium, 1-ethyl-2-(3-(1-ethyl-2(1H)-quinolinylidene)-1-propenyl)", "iodide, "alpha-(p-dimethylaminophenylethylene)quinoline ethiodide", "C.I. 808", "Eastman Kodak 622", G-1700, "Sensitol Red"

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Toxic by inhalation, in contact with skin and if swallowed.

#### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

#### SWALLOWED

- Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

#### EYE

- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

#### SKIN

- Skin contact with the material may produce toxic effects; systemic effects may result following absorption.
- The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

#### INHALED

- Inhalation of dusts, generated by the material, during the course of normal handling, may produce toxic effects.
- The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- Clinical signs of quinoline intoxication include lethargy, respiratory distress and prostration leading to coma.

#### CHRONIC HEALTH EFFECTS

- There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.

Based on experience with animal studies, there is a possibility that exposure to the material may result in toxic effects to the development of the fetus, at levels which do not cause significant toxic effects to the mother.







Iodine and iodides, may give rise to local allergic reactions such as hives, rupture of skin blood vessels, pain in joints or diseases of the lymph nodes.

Quinoline is a metabolite of this material and in mammals has been shown to cause cancers of the liver and blood vessels. Adequate data in humans is not available.

Iodine and iodides cause goiter and diminished as well as increased activity of the thyroid gland. A toxic syndrome resulting from chronic iodide overdose and from repeated administration of small amounts of iodine is characterized by excessive saliva production, head cold, sneezing, conjunctivitis, headache, fever, laryngitis, inflammation of the bronchi and mouth cavity, inflamed parotid gland, and various skin rashes. Swelling and inflammation of the throat, irritated and swollen eyes and lung swelling may also occur. Swelling of the glottis, necessitating a tracheotomy has been reported. Use of iodides in frequency can cause fetal death, severe goiter, hypothyroidism and the cretinoid appearance of the newborn. Some carbocyanines are cytotoxic.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

	Min	Max	
Flammability:	1		
Toxicity:	3		 <p>Min/Nil=0 Low=1 Moderate=2 High=3 Extreme=4</p>
Body Contact:	3		
Reactivity:	1		
Chronic:	2		

NAME	CAS RN	%
pinacyanol iodide	605-91-4	>98

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- - Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
  - At least 3 tablespoons in a glass of water should be given.
  - Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded because of the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non-availability of charcoal and the ready availability of the doctor.

NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.

- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of

the MSDS.  
(ICSC20305/20307).

## EYE

- If this product comes in contact with the eyes:
  - Immediately hold eyelids apart and flush the eye continuously with running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
  - Transport to hospital or doctor without delay.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

## SKIN

- If skin or hair contact occurs:
  - Quickly but gently, wipe material off skin with a dry, clean cloth.
  - Immediately remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
  - Transport to hospital, or doctor.

## INHALED

- - If fumes or combustion products are inhaled remove from contaminated area.
  - Lay patient down. Keep warm and rested.
  - Protheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
  - Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
  - Transport to hospital, or doctor, without delay.

## NOTES TO PHYSICIAN

- Treat symptomatically.  
for poisons (where specific treatment regime is absent):

### BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

### ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

## Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available

## EXTINGUISHING MEDIA

- - Foam.
  - Dry chemical powder.
  - BCF (where regulations permit).
  - Carbon dioxide.
  - Water spray or fog - Large fires only.

## FIRE FIGHTING

- - Alert Emergency Responders and tell them location and nature of hazard.
  - Wear full body protective clothing with breathing apparatus.
  - Prevent, by any means available, spillage from entering drains or water course.

- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

### GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- 
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen iodide, nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

### FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

### PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

## Section 6 - ACCIDENTAL RELEASE MEASURES

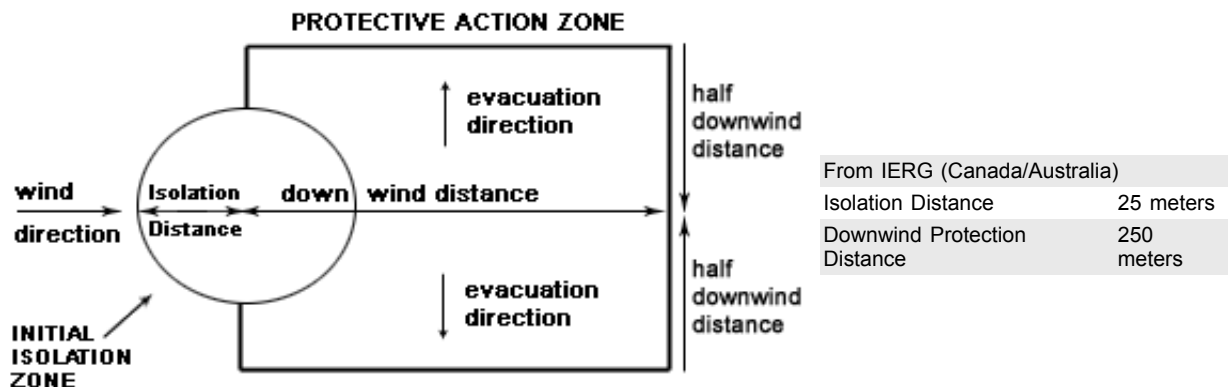
### MINOR SPILLS

- 
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

### MAJOR SPILLS

- 
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

### PROTECTIVE ACTIONS FOR SPILL



### FOOTNOTES

<sup>1</sup> PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action

distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 154 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

### **ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)**

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## **Section 7 - HANDLING AND STORAGE**

### **PROCEDURE FOR HANDLING**

- 
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### **RECOMMENDED STORAGE METHODS**

- 
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \* . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*. - \* unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic. All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

### **STORAGE REQUIREMENTS**

- 
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

## SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	pinacyanol iodide (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	pinacyanol iodide (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	pinacyanol iodide (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	pinacyanol iodide (Particulates not otherwise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	pinacyanol iodide (Particulates not otherwise regulated - Respirable fraction)		5						
US - Oregon Permissible Exposure Limits (Z3)	pinacyanol iodide (Inert or Nuisance Dust: (d) Respirable fraction)		5						*
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	pinacyanol iodide (Particulates not otherwise regulated Respirable fraction)		5						
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	pinacyanol iodide (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5						
US - Michigan Exposure Limits for Air Contaminants	pinacyanol iodide (Particulates not otherwise regulated, Respirable dust)		5						

### MATERIAL DATA

#### PINACYANOL IODIDE:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

### PERSONAL PROTECTION



Consult your EHS staff for recommendations

#### EYE

- 
- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

#### HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.



NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

## OTHER

- 
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- 
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1	-	PAPR-P1
	Air-line*	-	-
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3	-
		Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

- 
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;

(b): filter respirators with absorption cartridge or canister of the right type;

(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:

Air Speed:

direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion) 1-2.5 m/s (200-500 f/min.)

grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion). 2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

Upper end of the range

1: Room air currents minimal or favorable to capture

1: Disturbing room air currents

2: Contaminants of low toxicity or of nuisance value only

2: Contaminants of high toxicity

3: Intermittent, low production.

3: High production, heavy use

4: Large hood or large air mass in motion

4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	480.4
Melting Range (°F)	563 (decomposes)	Viscosity	Not Applicable
Boiling Range (°F)	Not applicable	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not available	pH (1% solution)	Not available
Decomposition Temp (°F)	563	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

### APPEARANCE

Dark-red powder; does not mix well with water. Soluble in alcohol giving red solutions. Solutions slowly decompose in light. pKb 11.25

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- 
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

### STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

## Section 11 - TOXICOLOGICAL INFORMATION

pinacyanol iodide

### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

IRRITATION

Intraperitoneal (rat) LD50: 16 mg/kg

Nil Reported

Intraperitoneal (mouse) LD50: 3 mg/kg

Intravenous (dog) LD50: 3.7 mg/kg

Intravenous (rabbit) LD50: 9 mg/kg

Subcutaneous (g.pig) LD50: 47 mg/kg

- In rabbits and dogs, quinoline and its metabolites are excreted in the urine. Urinary excretion of quinoline and its metabolites was nearly complete 24 hours after i.v. dosing of dogs with 20 or 25 mg/kg. Less than 0.5% of the administered quinoline was excreted unchanged. Approximately 29%-32% of the administered quinoline was recovered from the urine as 3-



hydroxyquinoline (free and conjugated forms). Approximately 0.4%-0.8% of free quinoline was detected in rabbit urine collected 24 hours after administration of an oral dose of 250 mg/kg. Approximately 6.7%-11.0% of the quinoline was determined to be excreted as a labile compound that yields quinoline on heating with acid. About 3%-4% of quinoline was excreted as the metabolite 5,6-dihydroxyquinoline.

Repeat dose toxicity: Groups of 20 male Sprague-Dawley rats were fed a diet containing 0.05% (low-dose), 0.10% (mid-dose), or 0.25% (high-dose) quinoline for approximately 16-40 weeks. Absolute and relative liver weights were significantly increased in all treatment groups, and the difference between initial and final mean body weights decreased with increasing dose. Histological examination of the liver revealed fatty change, bile duct proliferation, and oval cells in treated animals. Also, nodular hyperplasia was seen in the mid- and high-dose animals.

Carcinogenicity: No reliable human epidemiological studies are available that address the potential carcinogenicity of quinoline. However, laboratory studies have shown that quinoline is mitogenic and mutagenic in vitro and in vivo, and that humans and rats share a common quinoline-metabolizing P450 enzyme. Liver tumors have been observed in rats and mice exposed to quinoline via oral and i.p. routes of exposure, but not in rats exposed subcutaneously, despite the fact that the s.c. injections resulted in maximally tolerated doses more than 40 times higher than i.p. doses given to mice. The observation of skin tumors on mice dermally exposed to quinoline and tumor promoter tetradecanoyl phorbol acetate suggests that quinoline can initiate skin tumors (no other tumor types were reported) without first-pass metabolism in the liver, but the question of whether inhaled quinoline would have such effects without promotion remains.

Several animal studies report hepatocarcinogenicity (hepatocellular carcinomas and haemangioendotheliomas or haemangiosarcomas, a vascular tumor) in rats and mice following oral dosing with quinoline. Quinoline has also been reported to be a hepatocarcinogen in newborn mice following intraperitoneal exposure. Metastatic changes, arising from these tumors, were detected in the lungs of some of the rats. Hepatic tumours (carcinomas, adenomas, and basophilic altered foci) were observed in male newborn mice, but not male or female newborn rats. No tumors, but basophilic altered foci, were observed in female newborn mice.

Quinoline initiated skin tumors in female SENCAR mice following dermal application

Important aspects of the hepatocarcinogenicity of quinoline are the relatively short latency period (as low as 12 weeks) for tumor formation, and the fact that one of the tumor types observed, haemangioendotheliomas, is uncommon in rats and mice.

Other studies indicate species differences in regard to liver tumorigenesis by quinoline; mice and rats are most susceptible and hamsters and guinea pigs appear to be resistant.

Quinoline is considered likely to be carcinogenic in humans in accordance with proposed EPA carcinogen risk assessment guidelines (U.S. EPA, 1996) on the basis of observations of exposure-related increased incidence of an unusual malignant tumor in multiple strains of rats and mice, in multiple experiments using oral, dermal, i.p., and s.c. dosing, and at an early age. This determination is supported by studies that demonstrate that quinoline is genotoxic.

Quinoline can apparently act as a promoter of liver carcinogenicity as well. Quinoline, 3-fluoroquinone (3-FQ), or 5-fluoroquinone (5-FQ) were fed to F344 male rats in their diet (0.1% and 0.05%) for a period of 6 weeks following a single, 200 mg/kg i.p. injection of the liver carcinogen diethylnitrosamine (DEN). The number and areas of GST-P (placental glutathione S10 transferase)-positive foci induced in the liver increased significantly as a result of treatment with 0.1% but not 0.05% quinoline.

Genotoxicity: Quinoline is a mutagen in *Salmonella typhimurium* in the presence of metabolic activation. Quinoline has also been shown to induce chromosome aberrations and sister chromatid exchanges in the rat liver and micronucleus formation in the bone marrow of CD1 male mice. Although a predominance of data suggest that quinoline is genotoxic, the results of at least one study indicate that a nongenotoxic (i.e., mitogenic) mechanism of action may play a role in its hepatocarcinogenicity (Quinoline was found to have significant activity in the *Salmonella typhimurium* strain TA100, but generally not in strains TA1537 and TA1538, nor TA98, suggesting that it may be acting via base-pair substitution).

3-Fluoro- and 2- and 3-chloroquinolines were less mutagenic than all other fluoro- and chloro-substituted derivatives of quinoline. The 3-fluoro derivative of quinoline completely blocks the mutagenic activity of quinoline. Substitutions at other locations do not reduce quinoline's mutagenicity, and in some cases enhance it (presumably by inhibiting detoxification pathways).

Studies suggest that the 2,3-epoxide is the active metabolic mutagen based on the fact that the 4-chloro isomer is weakly mutagenic (presumably no mutagenicity would be observed if a 3,4-epoxide were necessary), the 4-methyl isomer is strongly mutagenic (suggested to be because of suppression of detoxification of the 2,3-epoxide), and the 2-methyl isomer is weakly mutagenic (the authors report that methyl substitution at the site of epoxide formation is known to partially reduce mutagenicity).

Convulsions recorded.

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

PINACYANOL IODIDE:

■ Iodine is an important element in studies of environmental protection and human health, global-scale hydrologic processes and nuclear nonproliferation. Biogeochemical cycling of iodine is complex, because iodine occurs in multiple oxidation states and as inorganic and organic species that may be hydrophilic, amphiphilic, and biophilic. Experiments illustrate complex behavior with various processes occurring, including iodate reduction, irreversible retention or mass loss of iodide, and rate-limited and nonlinear sorption. There was an appreciable iodate reduction to iodide, presumably mediated by the structural Fe(II) in some clay minerals; therefore, careful attention must be given to potential interconversion among species when interpreting the biogeochemical behavior of iodine in the environment.

Iodine (I<sub>2</sub>) is electrochemically reduced to ionic iodide by natural processes but humic acid appears to promote the reaction. The different oxidation species of iodine have markedly different sorption properties. Hence, changes in iodine redox states can greatly affect the mobility of iodine in the environment. A major microbial role has been suggested in the past to account for at least some of these redox changes. Both soluble ferrous iron and sulfide, as well as iron monosulfide (FeS) were shown to abiologically reduce iodate to iodide. These results indicate that ferric iron and/or sulfate reducing bacteria are capable of mediating both direct, enzymatic, as well as abiotic reduction of iodate in natural anaerobic environments.

Environmental and geological evidence indicates that iodine can become associated with natural organic matter (NOM) in soils and sediments. Previous studies have shown that iodine (including I<sub>2</sub>) can be strongly retained in organic-rich surface soils and sediment and that soluble iodine may be associated with dissolved humic material. Iodine and iodate undergo an abiotic pseudo first-order reaction with peat leading to either reduction of iodate or iodine to iodide or incorporation of the iodine atoms into the organic matrix. Iodine appears to be incorporated in sphagnum peat by aromatic substitution for hydrogen on phenolic constituents of the peat.

■ For quinoline:

Henry's Law constant: 2.49x10<sup>-7</sup> atm-m<sup>3</sup>mol<sup>-2</sup>

Koc 79-205

Bioconcentration factor 21

log Kow 2.03

Environmental fate:

When released to aquatic systems, quinoline will biodegrade. The rate depends upon temperature and microbial conditions,

with complete degradation occurring within 5 days. Quinoline is also likely to be photolysed at rates that depend on pH, depth of water, season, and presence of humic acids. Photolytic half-lives range from 21 days during the summer to 160 days during the winter. A low Henry's Law constant predicts little volatilisation.

Given a bioconcentration factor (BCF) of 21 and a Koc of 79-205, sorption to suspended sediments and bioaccumulation are likely to be responsible for a moderate-to-low level of removal from aquatic systems.

When released to soil, quinoline is likely to leach quickly into groundwater. It is predicted that less than 0.5% of quinoline released would sorb to sediments and particulates, and quinoline is likely to partition into water, given its moderate water solubility and low Kow. Once quinoline partitions to water, it is not likely to volatilise to air because of its low Henry's Law constant. There was no relation between adsorption and soil carbon content.

Biodegradation is likely to take place but, on the basis of information available for quinoline in water, hydrolysis, oxidation, and volatilisation should not be significant.

Quinoline released to the atmosphere is likely to react with hydroxyl radicals, with an estimated reaction half-life of 2.51 days. Because of its strong absorption of light wavelengths >290 nm, quinoline has the potential for direct photolysis in the atmosphere. Removal from the atmosphere can occur via wet and dry deposition.

■ DO NOT discharge into sewer or waterways.

### Ecotoxicity

Ingredient pinacyanol iodide	Persistence: Water/Soil HIGH	Persistence: Air	Bioaccumulation LOW	Mobility LOW
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## Section 13 - DISPOSAL CONSIDERATIONS

### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN2811	PG:	II
Label Codes:	6.1	Special provisions:	IB8, IP2, IP4, T3, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	212
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	25 kg
Quantity Limitations: Cargo aircraft only:	100 kg	Vessel stowage: Location:	B
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:

Toxic solids, organic, n.o.s.

### Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2811	Packing Group:	II
Special provisions:	A3		

Shipping Name: TOXIC SOLID, ORGANIC, N.O.S. \*(CONTAINS PINACYANOL IODIDE)

### Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2811	Packing Group:	II

EMS Number:	F-A,S-A	Special provisions:	274
Limited Quantities:	500 g		
Shipping Name:	TOXIC SOLID, ORGANIC, N.O.S.(contains pinacyanol iodide)		

## Section 15 - REGULATORY INFORMATION

**pinacyanol iodide (CAS: 605-91-4) is found on the following regulatory lists;**

"US - Hawaii Air Contaminant Limits", "US - Oregon Permissible Exposure Limits (Z3)", "US OSHA Permissible Exposure Levels (PELs) - Table Z3"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Cumulative effects may result following exposure\*.
- Limited evidence of a carcinogenic effect\*.
- Possible skin sensitizer\*.
- May possibly be harmful to the fetus/ embryo\*.

\* (limited evidence).

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■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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